

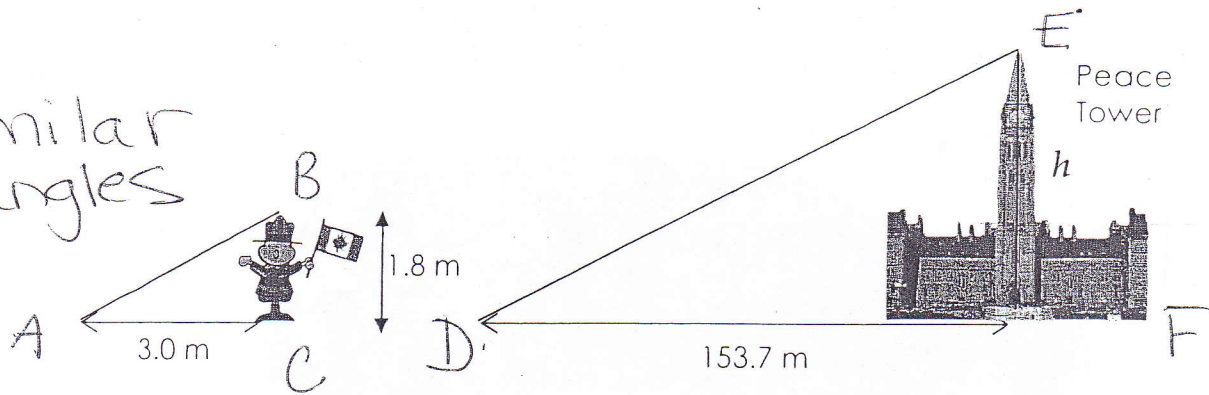
Jan. 9/12.

Summative
Jan 17+18
18+19.

A) Measurement and Trigonometry

A1) On Parliament Hill a Mountie and the Peace Tower cast shadows of different lengths. **Determine** the height of the Peace Tower.

similar triangles



$$\frac{AC}{DF} = \frac{BC}{EF}$$

set up a proportion

$$\frac{3.0}{153.7} = \frac{1.8}{h}$$

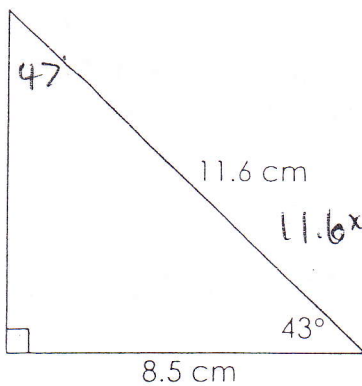
flip both proportions.

$$\frac{1.8 \times (153.7)}{3.0} = \left(\frac{h}{1.8}\right) \times 1.8$$

$$\frac{1.8 \times 153.7}{3.0} = h$$

$$h = 92.22$$

A2) Determine the value of x.



$$\sin \theta = \frac{o}{h}$$

$$11.6 \times (\sin 43^\circ) = \left(\frac{x}{11.6}\right) \times 11.6$$

$$11.6 \times \sin 43^\circ = x$$

$$7.9118 = x$$

$$x = 7.9118$$

∴ the length of x is 7.9 cm

A3) Phil drove from Ottawa to Boston. He travelled 270 kilometres in Canada and 250 miles in the US. **Determine** the total length of the trip.

* Convert *

$$\frac{x}{250 \text{ miles}} = \frac{1.61 \text{ km}}{1 \text{ mile}}$$

$$250 \times \left(\frac{x}{250}\right) = \left(\frac{1.61}{1}\right) \times 250$$

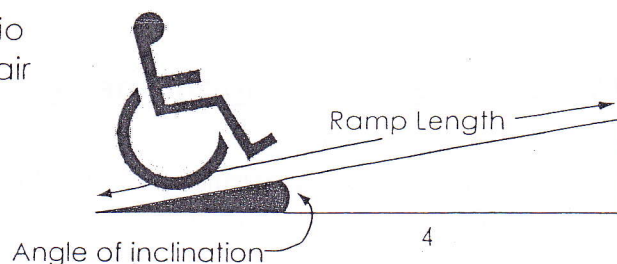
$$x = 402.5$$

$$402.5 + 270 = 672.5$$

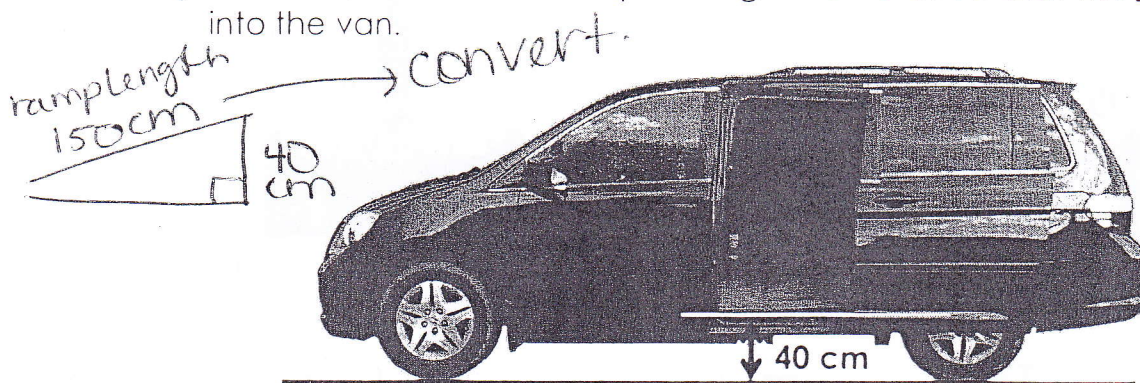
∴ total length is

$$672.5 \text{ km}$$

- A4) According to safety regulations, the ratio between the rise and run of a wheelchair ramp should not be greater than 1:4.



- a) Sara has a wheelchair ramp of length 1.5 m. **Show** that this is not safe to get into the van.



Find Bottom

$$a^2 + b^2 = c^2$$

$$1^2 + b^2 = 150^2$$

$$0 + b^2 = 22500$$

$$b^2 = 22500 - 1600$$

$$b^2 = 20900$$

$$b = \pm \sqrt{20900}$$

$$b \approx 144.5683$$

② Ratio of Sara's Ramp:

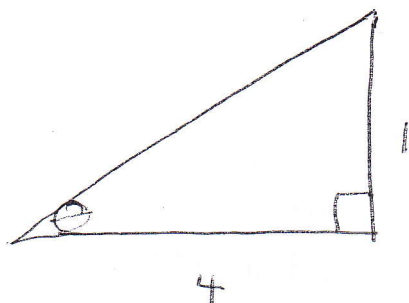
$$\frac{40}{150}$$

$$= 144.5683$$

$$= 0.2767$$

∴ Since 0.28 is greater than 0.25, the ramp is not safe.

- b) **Determine** the angle of inclination for a ramp that is safe for this van. Show your work.



$$\tan \theta = \frac{\text{opp.}}{\text{adj.}}$$

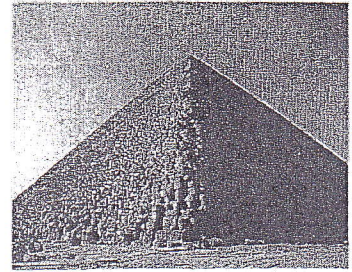
$$\tan \theta = \frac{1}{4}$$

$$\tan^{-1}(\tan \theta) = \tan^{-1}\left(\frac{1}{4}\right)$$

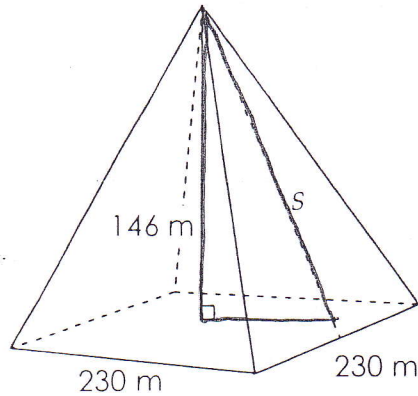
$$\theta \approx 14^\circ$$

∴ the angle of inclination is $\approx 14^\circ$.

A5) When it was first built, the Great Pyramid of Giza had a base that measured 230 metres by 230 metres and it was 146 metres tall.



a) **Determine** the total surface area of the Great Pyramid.



$$SA = \cancel{b^2} + 2bs$$

$$SA = 2bs$$

$$SA = 2(230)(?)$$

$$SA \approx 2(230)(185.85)$$

$$SA \approx 85491$$

S.A.

∴ Total S.A. of the great pyramid is 85491 m^2 .

Find s

$$a^2 + b^2 = c^2$$

$$(146)^2 + (115)^2 = c^2$$

$$\sqrt{34541} = c$$

$$185.85 \approx c$$

b) The surface of the Great Pyramid was covered with polished stones. These stones varied in size and shape but were approximately 5 ft wide by 5 ft long.

Estimate the number of polished stones that was required to cover the surface of the Great Pyramid.

Convert 5ft. to metres.

$$\frac{5\text{ft} \times x\text{m}}{5\text{ft}} = \frac{0.3048\text{m} \times 5\text{ft}}{1\text{ft}}$$

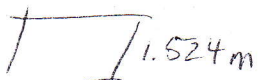
$$x \approx 1.524\text{m}$$

of stones ~~to~~ needed:

$$85491\text{m}^2 \div 2.322\text{m}^2 \approx 36808.3$$

∴ would need ≈ 36808 stones.

ind SA of 1 stone

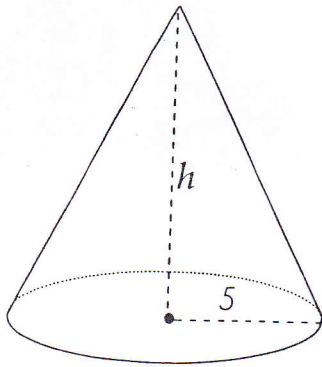


1.524 m

$$SA \approx 2.3226\text{m}^2$$

B) Modelling Linear Relations

B1) Complete the solution to **determine** the height of the cone.



$$V = \frac{\pi r^2 h}{3}$$

Solve for h

$$\frac{100}{5^2} = \frac{3.14 \times 5^2 \times h}{3}$$

$$\frac{4}{3.14} = \frac{3.14 \times h}{3}$$

$$3 \times 1.3 \approx \frac{h}{3} \times 3$$

$$3.9 = h$$

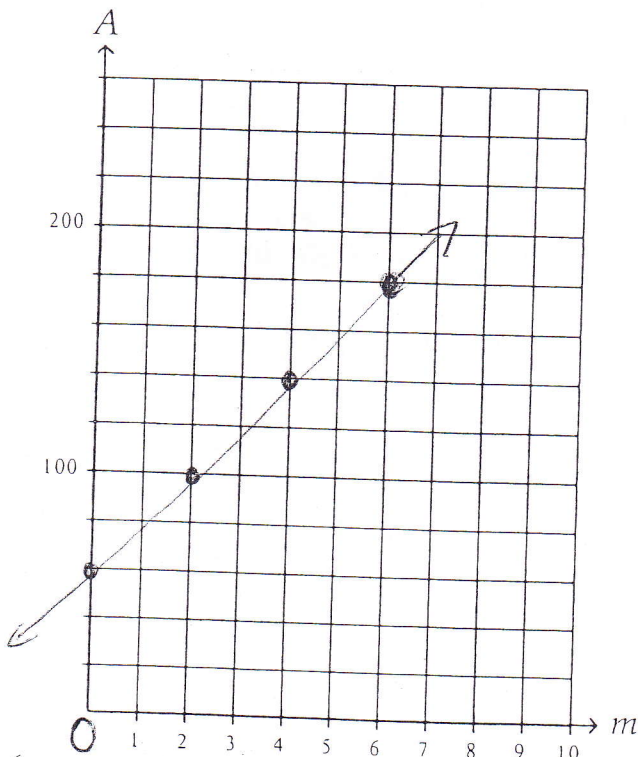
$$h \approx 3.9$$

$$\therefore h \approx 3.9.$$

$$y = mx + b$$

B2) The equation $A = 60 + 20m$ models the amount of medicine you give to your pet depending on its size, where A represents the amount of medicine in milligrams and m represents the pet's mass in kilograms.

Graph the equation.

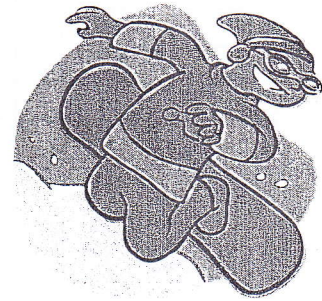
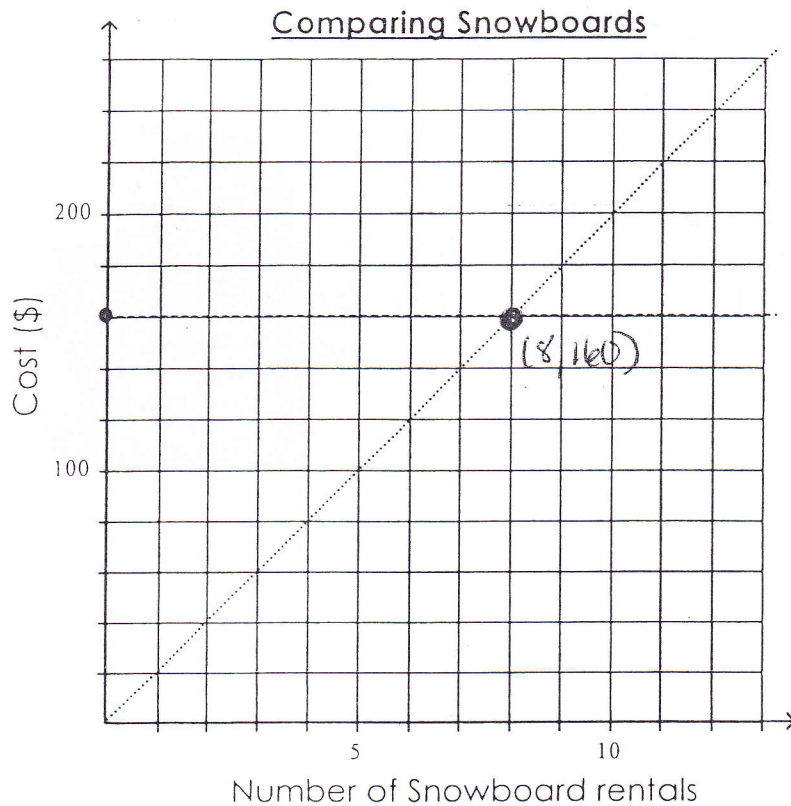


You could use this table to help

m	A
0	60
2	100
4	140
6	180

B3) Kyle wants to rent a snowboard:

- ❖ Ski Hillz charges \$20 per rental
- ❖ Slide Down charges \$160 for unlimited rentals



Legend:

..... Ski Hillz

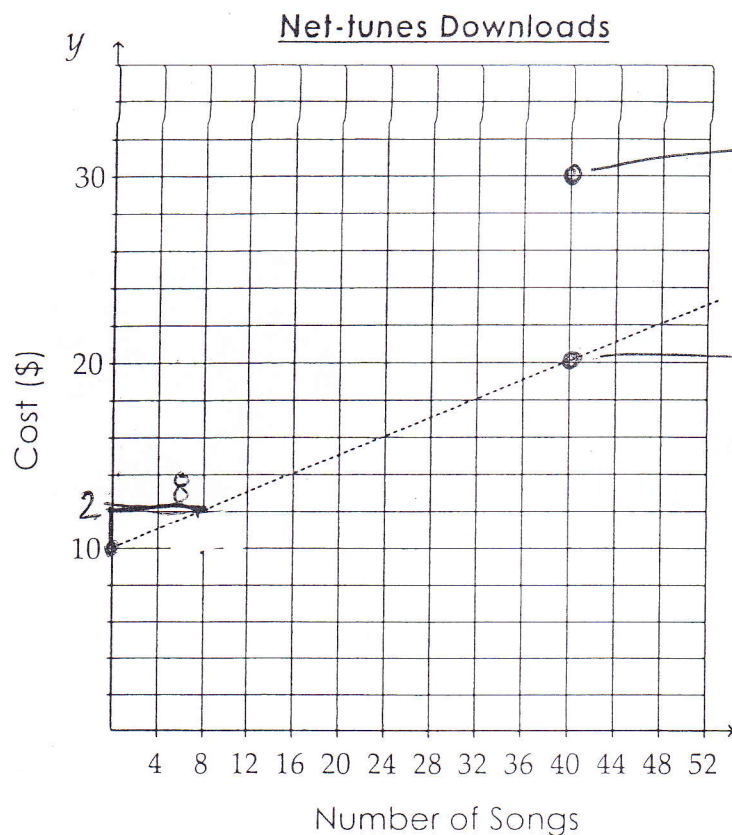
- - - Slide Down

Determine the point of intersection for the graph. **Explain** its meaning in this scenario (situation).

Pt. $(8, 160)$

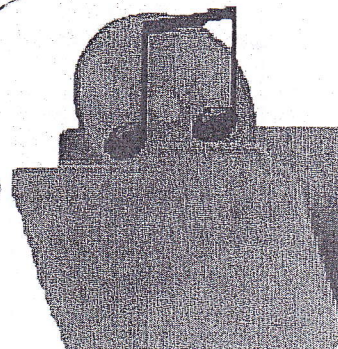
- Rent less than 8 times go to Ski Hillz for less than \$160.00.
- Rent more than 8 times go to Slide Down for \$160.00
- Rent exactly 8 times can go to either one for \$160.00

- B4) Net-tunes is trying a new way to charge for music downloads. The graph shows the total cost for downloading from Net-tunes.



what they want in question B4e)

40 for \$20



- a) **State** the y-intercept and **explain** what it means in this situation.

The y-intercept is \$10
The initial fee - without any downloads.

- b) **Determine** the slope. **Explain** what the slope means in this situation.

$$\frac{\text{Rise}}{\text{Run}} = \frac{2}{8} = \frac{1}{4} \text{ or } 0.25$$

∴ For every 4 songs its \$1 or \$0.25 per song.

- c) **Determine** an equation to model the relation for Net-tunes.

$$y = \left(\frac{1}{4}\right)x + 10 \longrightarrow \text{represent } \$10.$$

Slope
 $\frac{\text{rise}}{\text{run}}$

- d) A different company charges the same downloading fee per song as Net-tunes, but has a lower membership fee. **Describe** how the graph would be different from the graph for Net-tunes.

It would be the same slope but the graph begins at a lower value, i.e. less than 10.

- e) Net-tunes currently charges \$20 to download 40 songs.

Describe two possible ways they could change their fees so that downloading 40 songs cost \$30.

① Keep the same initial value of \$10 but increase the slope to $\frac{1}{25}$

$$\frac{20}{40}$$

② Increase the initial value to 20 but keep the same slope of $\frac{1}{4}$

B5) The Student Council plans to sell hoodies.
 Their supplier charges them a \$300 design fee and \$25 per hoodie.
 Student Council plans to sell the hoodies for \$40 each.

a) **Determine** how many hoodies Student Council needs to sell to make money.
 (i.e. solve the system)

$$\textcircled{1} \quad y = 300 + 25x$$

$$\textcircled{2} \quad y = 40x$$

Substitution

sub $\textcircled{1}$ into $\textcircled{2}$:

$$300 + 25x = 40x$$

$$300 = 40x - 25x$$

$$300 = 15x$$

$$\frac{15}{15} \quad \frac{15}{15}$$

$$20 = x$$

sub $x = 20$ into $\textcircled{2}$

$$y = 40x$$

$$y = 40(20)$$

$$y = 800$$

•• They need to sell 20 hoodies
 minimum to make \$800.

Recall

- Substitution
- Elimination
- graphing (not as reliable)

Elimination

$$y = 300 + 25x$$

$$- y = 40x$$

$$0y = 300 - 15x$$

$$15x = 300$$

$$\frac{15}{15} \quad \frac{15}{15}$$

$$x = 20$$

Then

sub $x = 20$ into $\textcircled{2}$

$$y = 40x$$

$$= 40(20)$$

$$y = 800$$



b) If the supplier increased the cost of each hoodie, **explain** the different ways the Student Council can still make money from selling hoodies.

- They can double the cost (selling price) of each hoodie

- They can go to a different ~~of~~ supplier.

C) Quadratic Relations

C1) Expand $(x-3)(x+7)$

$$\begin{aligned} &= x^2 + 7x - 3x - 21 \\ &= x^2 + 4x - 21 \end{aligned}$$

C2) Given $y = x^2 + 7x + 10$

$$= (x+5)(x+2)$$

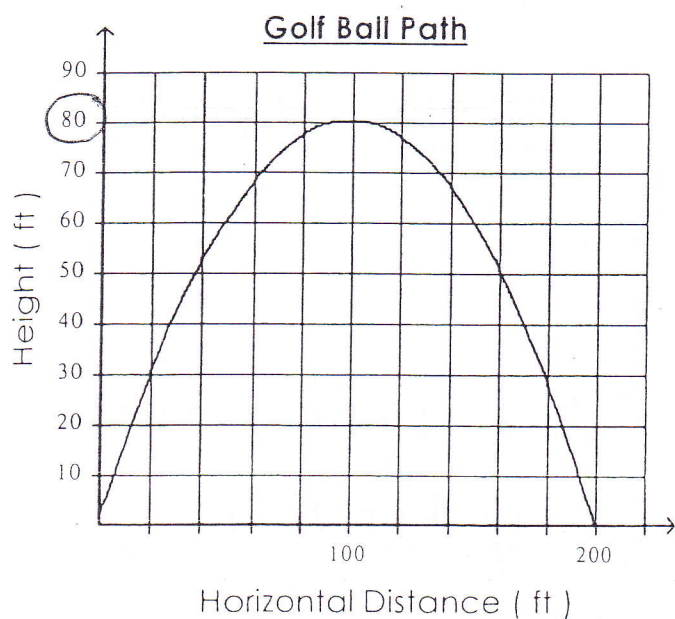
$y =$ end # in standard form

or
 $y = \text{mult} \cdot 5x - 2 = 10.$

State the x -intercepts -5 & -2

State the y -intercept 10

C3) A golfer hits a ball and the path of the ball is modelled by the graph below.



Determine the following:

a) The maximum height the ball reaches.

80 feet.

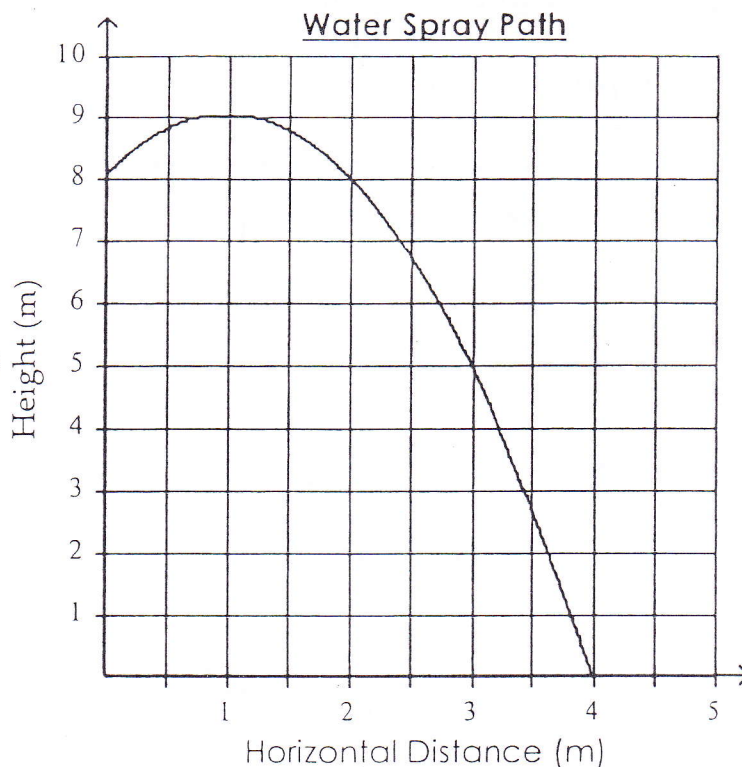
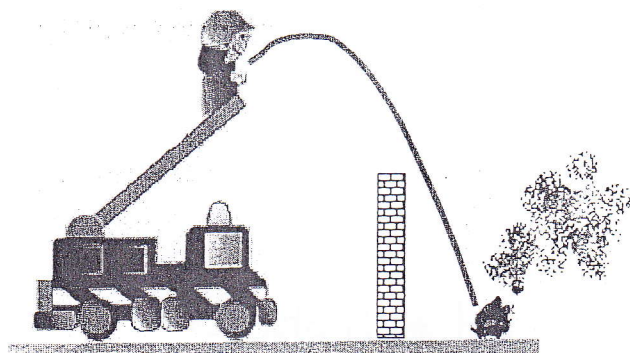
b) How far the ball travels horizontally.

200 feet

c) The horizontal distance(s) when the ball is 30 feet off the ground.

20 feet and 80 feet

C4) A firefighter is trying to spray water over a wall to put out a fire.



a) **State** the y-intercept and **explain** what it means in this situation.

The y intercept is 8m.

It means the fireman is 8m off the ground (or)

water is being sprayed from 8m high.

b) **State** the zero shown on the graph and **explain** what it means in this situation.

The zero is 4m.

It means the water puts out the fire 4m away from the truck.

c) **State** the vertex and **explain** what it means in this situation.

$(1, 9)$
1m from truck
water is 9m at its maximum height

at 1m from the truck the water reaches its max height of 9m.

d) **Determine** whether the water could pass over a wall located 3 metres away from the fire truck. **Justify** your answer. below

IF the wall is 5 meters. ~~or~~
~~under~~

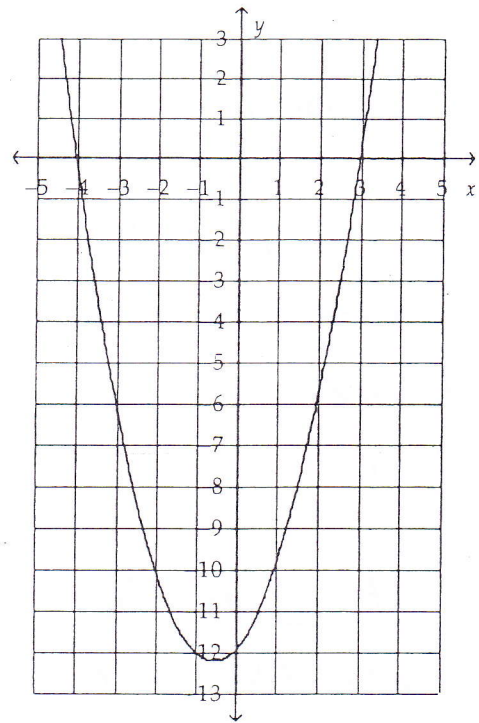
Any wall that is 5 meters or taller will block the water.

C5) Mr. Cahill gave his class the following problem:

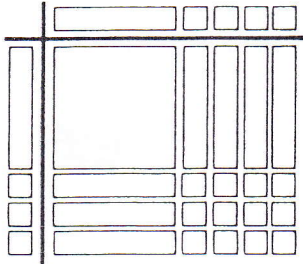
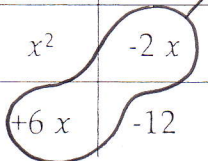
$$\begin{array}{r} \cancel{6 \times 2} \\ 4 \times 3 \\ + 4 - 3 = 1 \end{array}$$

" The graph shows the parabola for the equation $y = x^2 + x - 12$. Create a model to represent the factored form. "

$$y = (x+4)(x-3)$$



Three students gave the following incorrect solutions.

Incorrect Solutions	Explain what each student did wrong									
<p>Sasha's Solution</p> 	<p>Sasha gets $(x+4)(x+3)=x^2+7x+12$ but it should be $(x+4)(x-3)=x^2+x-12$.</p>									
<p>Jeff's Solution</p> $y=x^2+x-12$ $y=(x+3)(x-4)$	<p>Jeff's expanded</p> $y=(x+3)(x-4)$ $=x^2-4x+3x-12$ $=x^2-x-12 \text{ (wrong)}$ <p>but it should be</p> $(x-3)(x+4)=x^2+x-12$									
<p>Suresh's Solution</p> <table border="1" data-bbox="121 1610 456 1845"><tr><td></td><td>x</td><td>-2</td></tr><tr><td>x</td><td>x^2</td><td>$-2x$</td></tr><tr><td>$+6$</td><td>$+6x$</td><td>-12</td></tr></table> 		x	-2	x	x^2	$-2x$	$+6$	$+6x$	-12	<p>When the two middle terms are simplified the result will be $+4x$ which is not correct</p> <p>This means that the two brackets that multiple together are wrong $(x+6)(x-2)$</p>
	x	-2								
x	x^2	$-2x$								
$+6$	$+6x$	-12								